WHAT IS CLAIMED IS:

1. A method for monitoring the quality of a photonic crystal fiber, the method comprising:

launching test light into an end of the photonic crystal fiber;

detecting measurement light from the photonic crystal fiber in response to the launch ed test light; and

determining the quality of the photonic crystal fiber according to the measurement light.

2. The method of claim 1, wherein the test light comprises a test pulse at a first wavelength.

3. The method of claim 1, wherein the test light comprises a test pulse at multiple wavelengths.

4. The method of claim 1, wherein the test light comprises multiple pulses each at a different wavelength.

5. The method of claim 1, further comprising measuring a first measurement signal corresponding to the intensity of the measurement light at a first wavelength, the first wavelength being related to a bandgap of the photonic crystal fiber.

6. The method of claim 5, wherein the first wavelength is near the edge of the bandgap of the photonic crystal fiber.

7. The method of claim 5, further comprising measuring a second measurement signal corresponding to the intensity of the measurement light at a second wavelength different from the first wavelength, the second wavelength being related to the bandgap of the photonic crystal fiber.

8. The method of claim 7, wherein determining the quality of the photonic crystal fiber comprises determining a difference between the first measurement signal and the second measurement signal.

9. The method of claim 7, wherein the first wavelength is selected near to a first edge of a bandgap of the photonic crystal fiber.

10. The method of claim 9, wherein the second wavelength is selected near to a second edge of the bandgap of the photonic crystal fiber.

11. The method of claim 10, further comprising measuring a third measurement signal corresponding to the intensity of the measurement light at a third wavelength different from the first and second wavelengths, the third wavelength being selected near to the center of the bandgap of the photonic crystal fiber.

12. The method of claim 9, wherein the second wavelength is selected near to the center of the bandgap of the photonic crystal fiber.

13. The method of claim 1, further comprising measuring a time lapse between launching the test light and detecting the measurement light and determining a distance related to the time lapse.

14. The method of claim 1, wherein detecting the measurement light comprises detecting the measurement light from the end of the photonic crystal fiber.

15. The method of claim 1, wherein the detecting the measurement light further comprises detecting backscattered light from the photonic crystal fiber in response to the launched test light.

16. The method of claim 1, further comprising drawing a photonic crystal fiber preform into the photonic crystal fiber wherein determining the quality of the photonic crystal fiber occurs during the drawing.

17. The method of claim 1, further comprising cabling the photonic crystal fiber wherein determining the quality of the photonic crystal fiber occurs during the cabling.

18. The method of claim 1, wherein the photonic crystal fiber is a Bragg fiber.

19. The method of claim 1, wherein launching the test light comprises heating a photonic crystal fiber preform to cause thermal emission of the test light.

20. The method of claim 1, wherein determining the quality of the photonic crystal fiber includes monitoring relative changes of the measurement light intensity about a center wavelength of the bandgap of the photonic crystal fiber.

21. The method of claim 20, wherein determining the quality of the photonic crystal fiber includes differentiating between different photonic crystal fiber defects based on the relative changes of the measurement light intensity.

22. The method of claim 20, wherein the different photonic crystal fiber defects include layer defects and core radius defects.

23. The method of claim 7, wherein monitoring the quality of the photonic crystal fiber includes differentiating between different photonic crystal fiber defects based on the function of the first measurement signal and the second measurement signal.

24. The method of claim 23, wherein the different photonic crystal fiber defects include layer defects and core radius defects.

25. The method of claim 23, wherein the function is based on the difference between the first measurement signal intensity and the second measurement signal.

26. The method of claim 23, wherein the function is the difference between the first measurement signal and the second measurement signal.

27. An apparatus for monitoring the quality of a photonic crystal fiber, comprising:

a light source capable of providing test light at a first wavelength related to a bandgap of the photonic crystal fiber;

an optical assembly positioned to direct light from the light source into an end of the photonic crystal fiber and to collect light from the end of the photonic crystal fiber;

a detector positioned to detect the light collected from the photonic crystal fiber in response to the test light, and the detector is capable of detecting light at the first wavelength and light at the second wavelength; and

an electronic controller coupled to the light source and detector, wherein during operation the electronic controller causes the light source to emit test light having a first component at the first wavelength and a second component at the second wavelength and the controller records an the intensity of a first measurement signal corresponding to the first test light component and the intensity of a second measurement signal corresponding to the second test light component, and the controller monitors the quality of the photonic crystal fiber from a function of the intensity of the first and second measurement signals..

28. The apparatus of claim 27, wherein during operation the controller monitors a time lapse between the light source emitting the test light and the detector detecting the corresponding measurement signal.

29. The apparatus of claim 27, wherein the light source is capable of emitting test light having a first component at the first wavelength and a second component at a second wavelength different from the first wavelength, and wherein the second wavelength is related to the bandgap of the photonic crystal fiber.

30. The apparatus of claim 29, wherein the function of the intensity of the first and second measurement signals is based on a difference between the first and second measurement signals.

31. The method of claim 29, wherein the function of the intensity of the first and second measurement signals is a difference between the first and second measurement signals.

32. The apparatus of claim 28, wherein the first wavelength is near a first edge of the photonic bandgap of the photonic crystal fiber.

33. The apparatus of claim 32, wherein the second wavelength is near a second edge of the photonic band gap of the photonic crystal fiber, the second edge being different from the first edge.

34. The apparatus of claim 32, wherein the second wavelength is near the center of the photonic bandgap of the photonic crystal fiber.

35. The apparatus of claim 27, further comprising a photonic crystal fiber preform wherein at least a portion of the optical assembly is positioned within a hollow core of a photonic crystal fiber preform from which the photonic crystal fiber is drawn.

36. The apparatus of claim 27, wherein the optical assembly comprises a length of photonic crystal fiber.

37. The apparatus of claim 27, wherein the photonic crystal fiber is a Bragg fiber.

38. The apparatus of claim 27, further comprising a photonic crystal fiber drawing apparatus, wherein the electronic controller causes the light source to emit test

light and records the intensity of the first measurement signal while the photonic crystal fiber is drawn using the photonic crystal fiber drawing apparatus.

39. The apparatus of claim 27, further comprising a photonic crystal fiber cabling apparatus, wherein the electronic controller causes the light source to emit test light and records the intensity of the first measurement signal while the photonic crystal fiber is cabled using the photonic crystal fiber cabling apparatus.

40. A method for monitoring the quality of an optical waveguide, the method comprising:

launching test light into an end of the optical waveguide;

detecting measurement light emitted from the optical waveguide in response to the test light;

measuring a first measurement signal related to the measurement light intensity at a first wavelength and a second measurement signal related to the measurement light intensity at a second wavelength; and

monitoring the quality of the optical waveguide based on a function of the first measurement signal and the second measurement signal.

41. The method of claim 40, wherein the test light comprises a test pulse at the first wavelength.

42. The method of claim 40, wherein the test light comprises a test pulse at multiple wavelengths including the first and second wavelengths.

43. The method of claim 41, wherein the test light comprises a second pulse at the second wavelength.

44. The method of claim 40, wherein the optical waveguide comprises a photonic crystal fiber and the first and second wavelengths are related to a bandgap of the photonic crystal fiber.

45. The method of claim 44, wherein the first wavelength is located near a first edge of the bandgap

46. The method of claim 45, wherein the second wavelength is located near the center of the bandgap.

47. The method of claim 45, wherein the second wavelength is located near a second edge of the bandgap different from the first edge.

48. The method of claim 38, further comprising measuring a time lapse between the launching of the test light and the detecting the measurement light, and determining a position of a defect in the optical waveguide according to the time lapse.

49. The method of claim 40, further comprising drawing an optical waveguide preform to form the optical waveguide wherein monitoring the quality of the optical waveguide occurs during drawing.

50. The method of claim 40, further comprising cabling the optical waveguide wherein monitoring the quality of the optical fiber occurs during the cabling.

51. The method of claim 40, wherein the test light comprises light having a desired mode.

52. The method of claim 40, wherein the optical waveguide has a hollow core.

53. The method of claim 40, wherein detecting the measurement light comprises detecting the measurement light emitted from the end of the optical waveguide.

54. The method of claim 40, wherein optical waveguide comprises an optical fiber.

55. The method of claim 44, wherein monitoring the quality of the photonic crystal fiber includes differentiating between different photonic crystal fiber defects based on the function of the first measurement and the second measurement signal.

56. The method of claim 55, wherein the different photonic crystal fiber defects include layer defects and core radius defects.

57. The method of claim 40, wherein the function is based on a difference between the first measurement signal and the second measurement signal.

58. The method of claim 40, wherein the function is the difference between the first measurement signal and the second measurement signal.